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(54) **INPUT/OUTPUT CONNECTOR CONTACT CLEANING**

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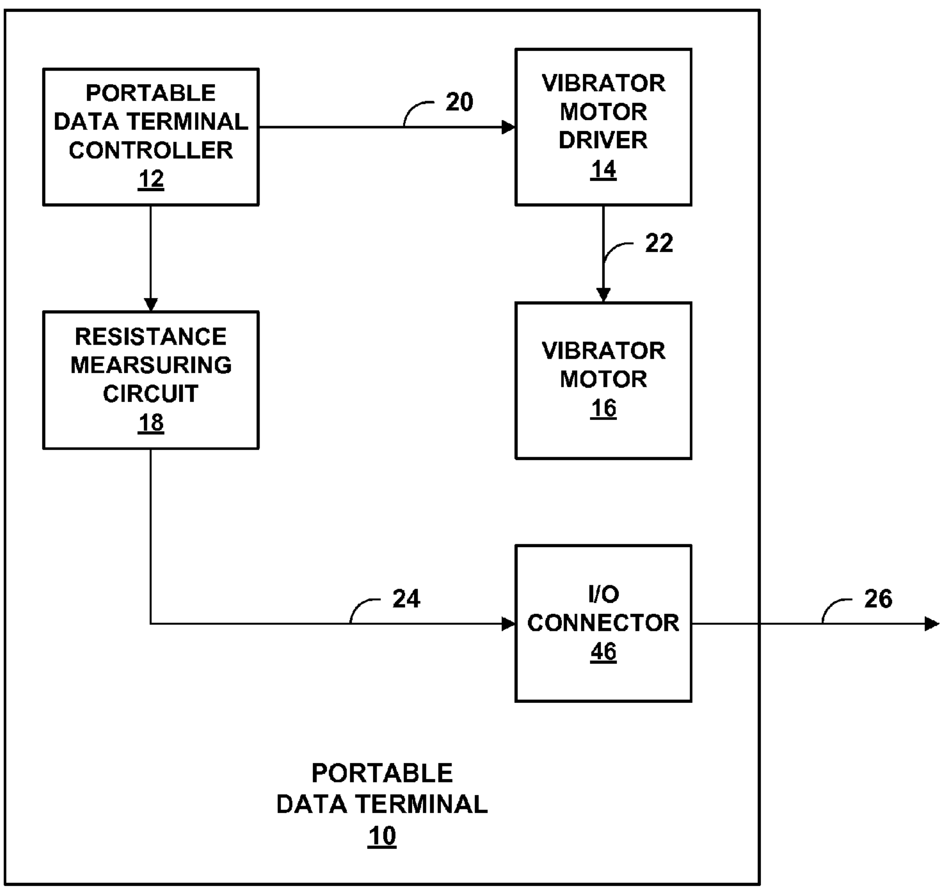
USPC **700/280**

(57) **ABSTRACT**

In some examples, a portable data terminal (PDT) is configured to vibrate when it is installed in a base (e.g., of a docking station), which may help improve the electrical contact between the PDT and the base. For example, when the PDT is installed in a base and subsequently vibrated, the electrical contacts of the PDT may vibrate against opposing electrical contacts in the base, which may help remove contaminants, such as dirt and other debris, from between the electrical contacts of the PDT and the base.



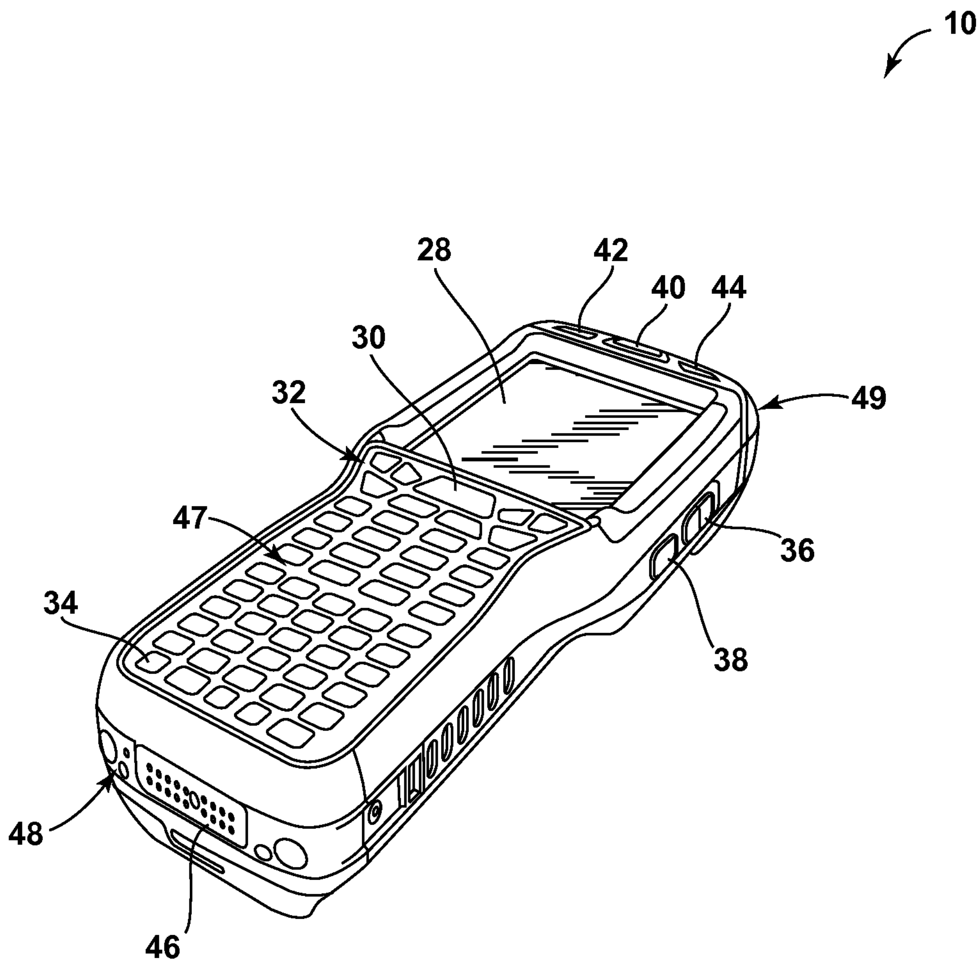


FIG. 1

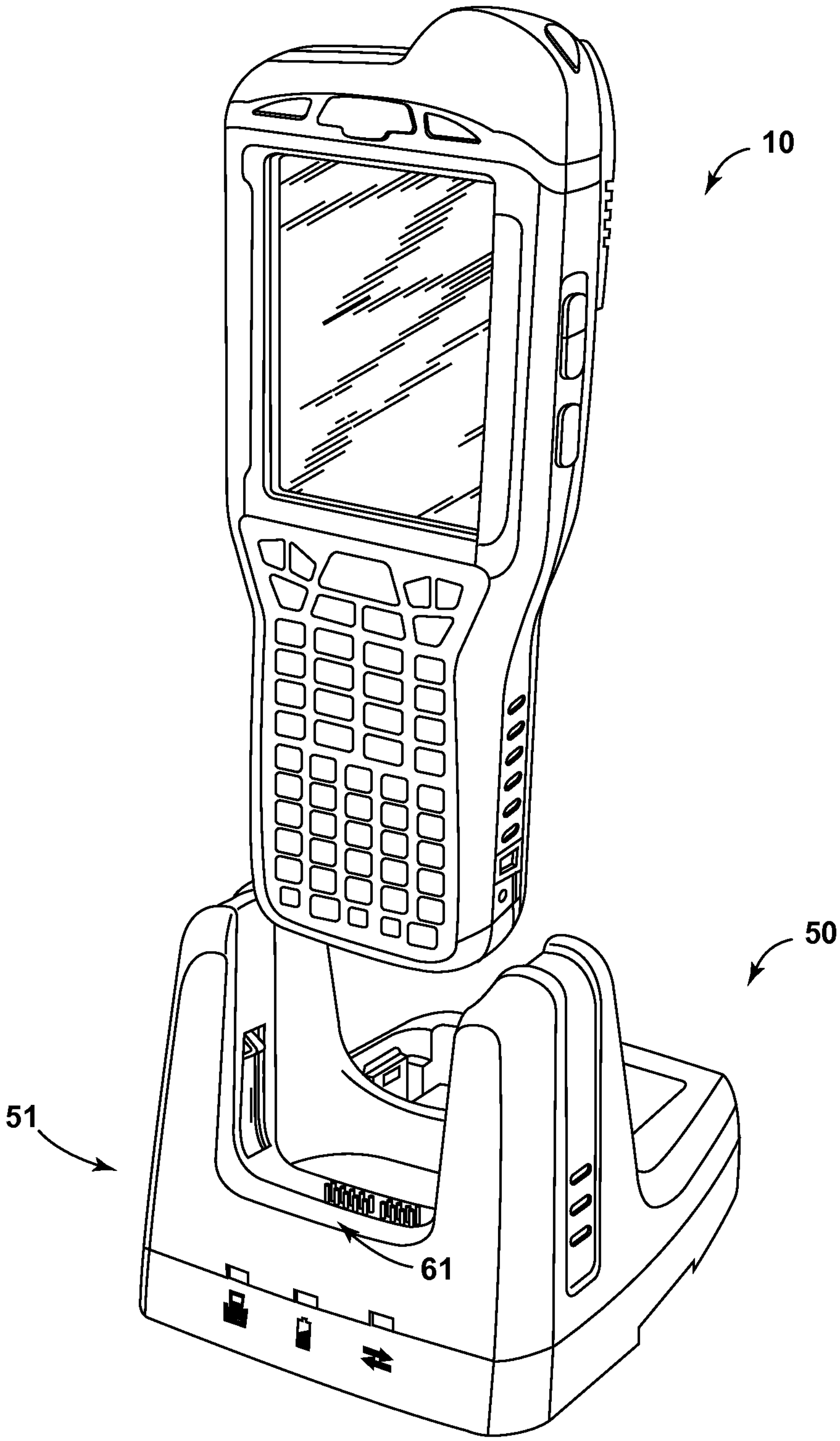


FIG. 2

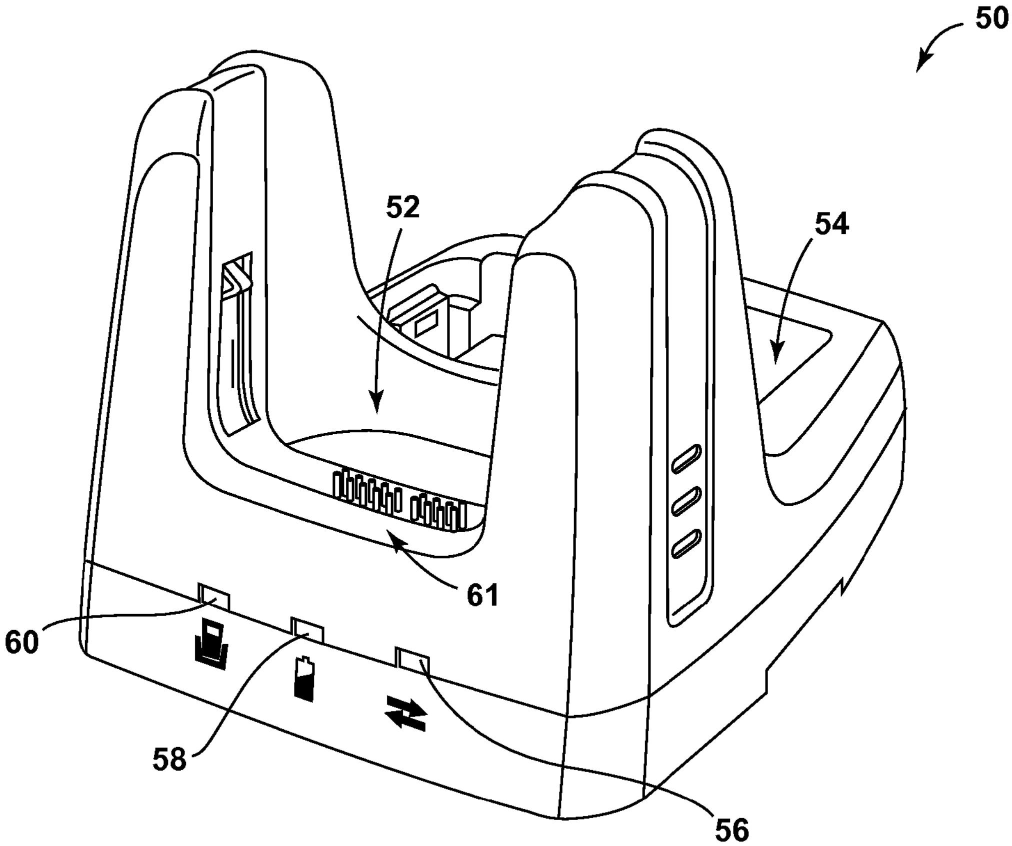


FIG. 3

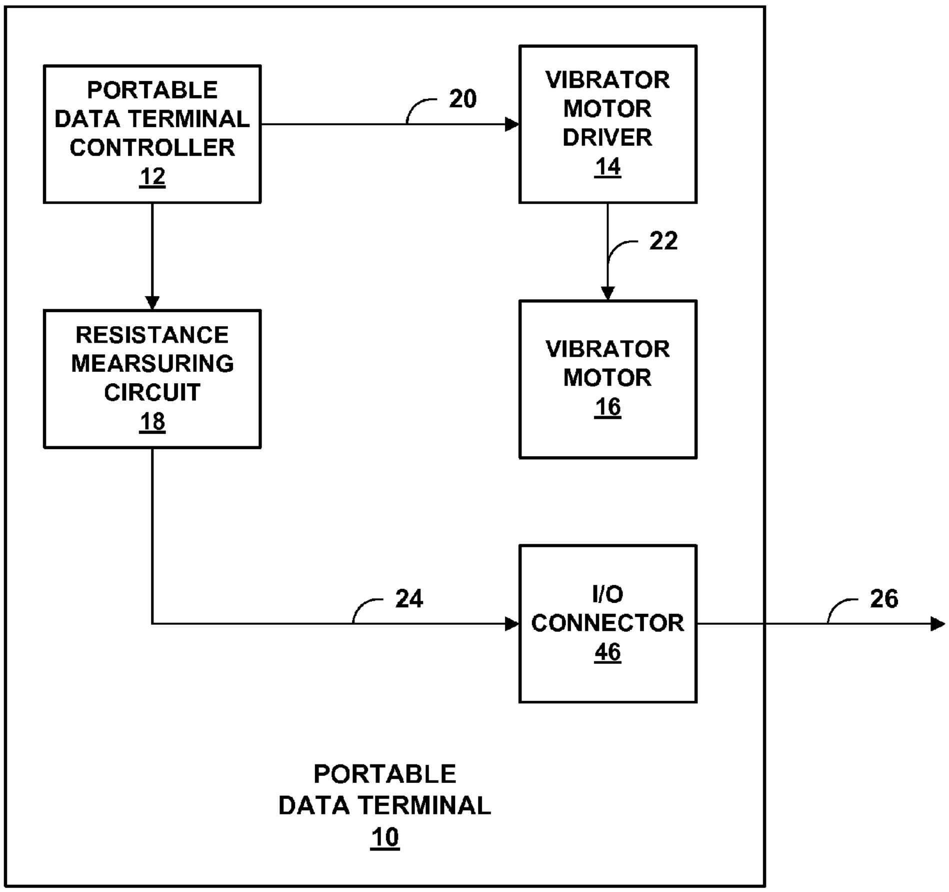

PORTABLE
DATA TERMINAL
CONTROLLER
12
20
VIBRATOR
MOTOR
DRIVER
14
22
RESISTANCE
MEARSURING
CIRCUIT
18
VIBRATOR
MOTOR
16
24
I/O
CONNECTOR
46
26
PORTABLE
DATA TERMINAL
10

FIG. 4

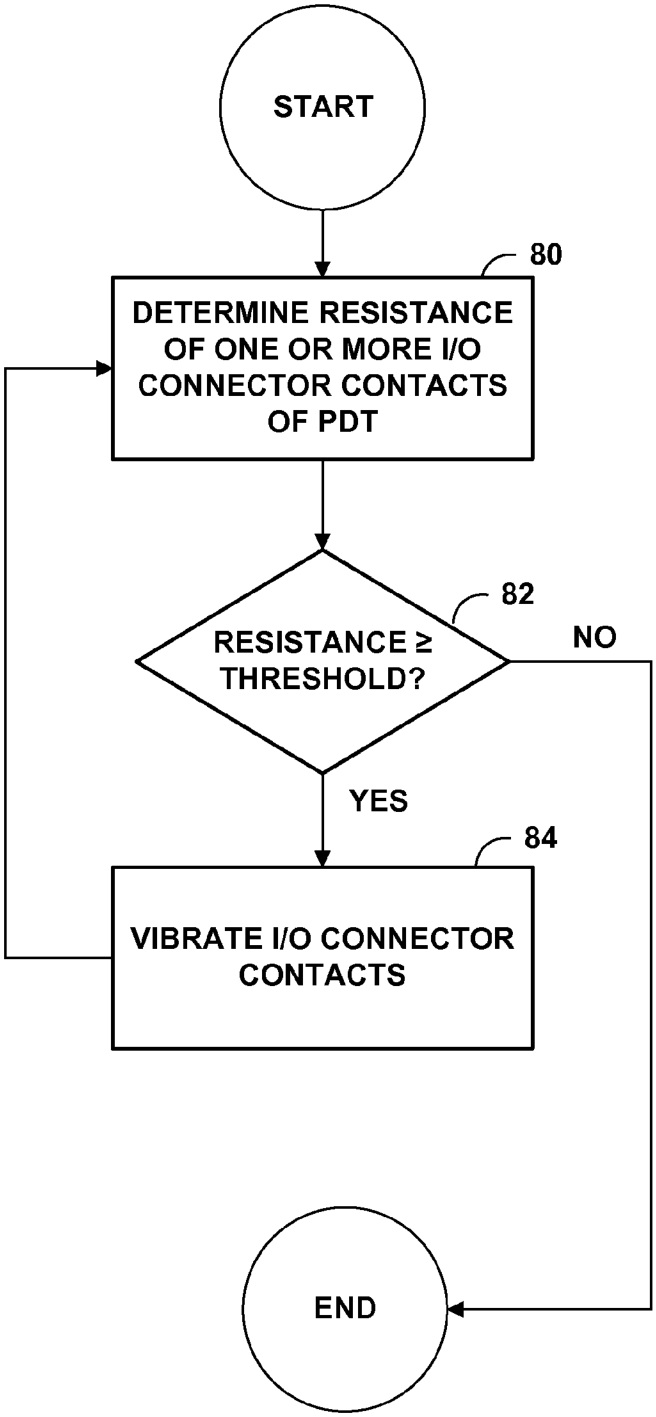

START
80
DETERMINE RESISTANCE OF ONE OR MORE I/O CONNECTOR CONTACTS OF PDT
82
RESISTANCE ≥ THRESHOLD?
NO
YES
84
VIBRATE I/O CONNECTOR CONTACTS
END

FIG. 5

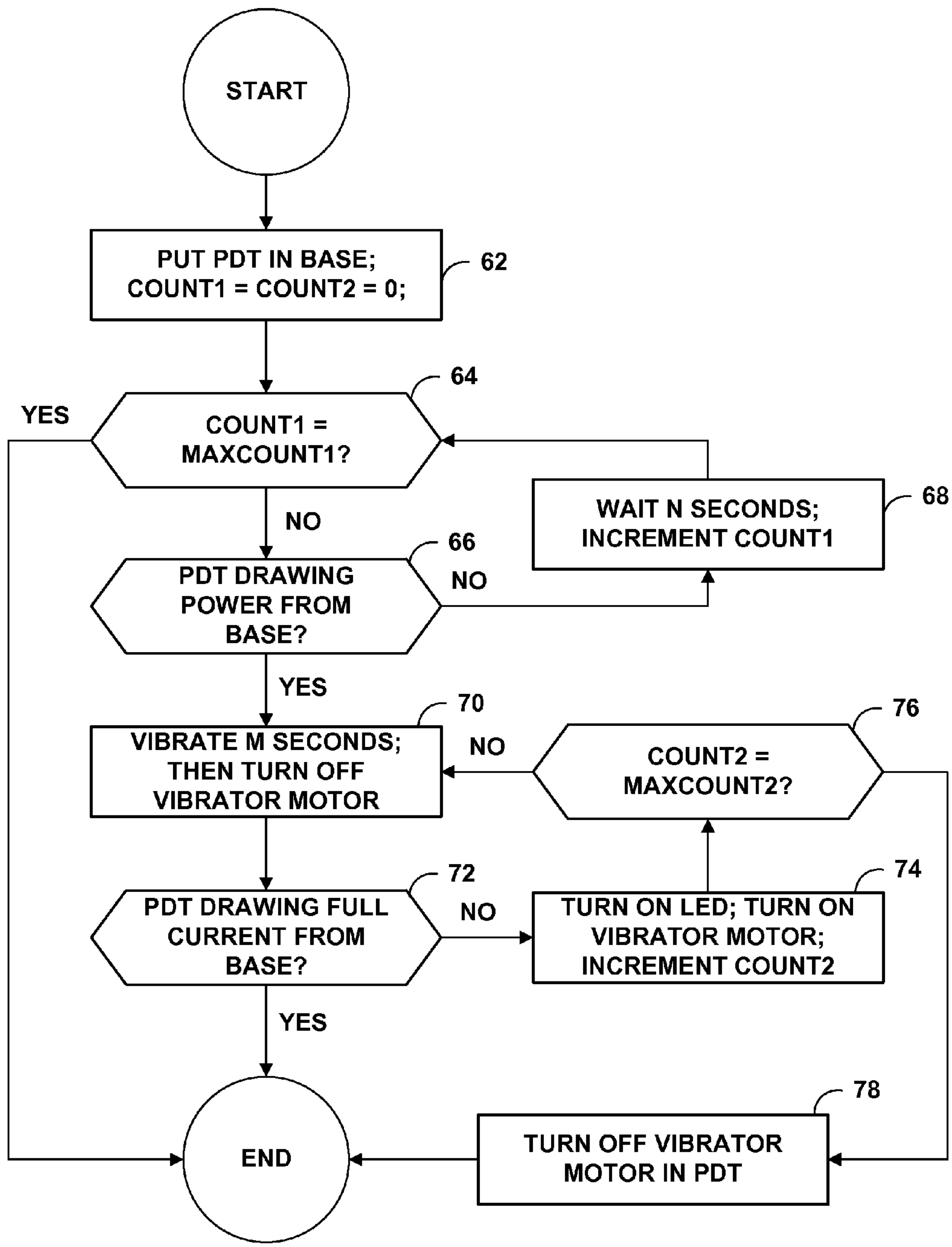

START
PUT PDT IN BASE; COUNT1 = COUNT2 = 0;
62
64
YES
COUNT1 = MAXCOUNT1?
NO
WAIT N SECONDS; INCREMENT COUNT1
68
66
PDT DRAWING POWER FROM BASE?
NO
YES
70
VIBRATE M SECONDS; THEN TURN OFF VIBRATOR MOTOR
NO
76
COUNT2 = MAXCOUNT2?
72
PDT DRAWING FULL CURRENT FROM BASE?
NO
TURN ON LED; TURN ON VIBRATOR MOTOR; INCREMENT COUNT2
74
YES
78
END
TURN OFF VIBRATOR MOTOR IN PDT

FIG. 6

INPUT/OUTPUT CONNECTOR CONTACT CLEANING

TECHNICAL FIELD

[0001] This disclosure relates to a portable data terminal (PDT).

BACKGROUND

[0002] Portable data terminals (PDTs) are used in many applications, including industrial data collection, bar code decoding, field data processing, and data transfer to larger data processing systems. In some cases, a PDT comprises a mobile computer, keypad, and data acquisition device. The mobile computer may include, for example, a hand held (also referred to as a "pocket") computing device and a keypad in one of a variety of configurations. The data acquisition device of the PDT may be configured to capture data from one or more of images, bar codes, and radio frequency identification (RFID) tags. The PDT may also acquire data from a user via the keypad or a touch pad associated with the mobile computer. Some PDTs are configured to connect to a docking station, e.g., to at least one of recharge the PDT power source, transfer data to a host computer, and receive data from the host computer.

SUMMARY

[0003] Devices, systems, and techniques for cleaning an input/output (I/O) connector of a PDT are described herein. In some examples, a PDT comprises a housing that includes an I/O connector configured to be mechanically and electrically connected to a base (e.g., a docking station), e.g., to at least one of recharge the PDT power source, transfer data to an external host computer, and receive data from the host computer. Dirt and debris may accumulate on the connector contacts of the I/O connector during use of the PDT, which may adversely affect the electrical contact between the I/O connector of the PDT and an I/O connector of a base when the PDT is docked in the base. The PDT is configured to vibrate when it is docked in a base, such that the connector contacts of the I/O connector may vibrate against opposing contacts of the I/O connector of the base. This vibration may help clean the I/O connector of the PDT, e.g., by pushing dirt and debris that may be positioned between the I/O connector contacts of the PDT and the base to help improve the electrical contact between the I/O connector contacts of the I/O connector of the PDT and the I/O connector contacts of the I/O connector of the base.

[0004] In one example, the disclosure is directed to a method comprising determining, with a controller, an electrical resistance of a connector contact of an input/output (I/O) connector of a portable data terminal (PDT), determining, with the controller, that the electrical resistance of the connector contact of the I/O connector is greater than or equal to a predetermined threshold, and, in response to determining the electrical resistance of the connector contact of the I/O connector is greater than or equal to the predetermined threshold, activating, with the controller, a vibrator motor configured to vibrate the connector contact of the I/O connector.

[0005] In another example, the disclosure is directed to a system comprising a PDT that includes an input/output (I/O) connector including a connector contact. The system further comprises a resistance measuring circuit electrically connected to the connector contact of the I/O connector, a vibrator motor, and a controller configured to control the vibrator motor. The controller is configured to determine an electrical resistance of the connector contact of the I/O connector via the resistance measuring circuit, and, in response to determining the resistance of the connector contact is greater than or equal to a resistance threshold, control the vibrator motor to vibrate.

[0006] In another example, the disclosure is directed to a system comprising a portable data unit (PDT) comprising means for receiving input and output signals. The system further comprises means for vibrating the means for receiving input and output signals, means for determining electrical resistance of the means for receiving input and output signals, means for determining that the electrical resistance of the means for receiving input and output signals is greater than or equal to a predetermined threshold, and means for activating the means for vibrating the means for receiving input and output signals in response to determining the electrical resistance of the means for receiving input and output signal is greater than or equal to the predetermined threshold.

[0007] The details of one or more examples are set forth in the accompanying drawings and the description below. Other features, objects, and advantages in addition to those described below will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF DRAWINGS

[0008] FIG. **1** illustrates an example portable data terminal (PDT) that includes an I/O connector configured to electrically connect the PDT to a base docking station.

[0009] FIG. **2** illustrates the PDT of FIG. **1** and an example base docking station.

[0010] FIG. **3** illustrates the example base docking station of FIG. **2** in further detail, where the docking station includes a plurality of electrical contacts configured to electrically connect with the PDT I/O connector.

[0011] FIG. **4** is a functional block diagram illustrating an example PDT that includes a controller connected to a vibrator motor drive circuit, a vibrator motor, and a resistance measurement circuit.

[0012] FIG. **5** is a flow diagram illustrating an example technique for cleaning an I/O connector of a PDT.

[0013] FIG. **6** is a flow diagram illustrating another example technique for cleaning an I/O connector of a PDT.

DETAILED DESCRIPTION

[0014] In some examples, a PDT may include a plurality of internal components packaged into an outer housing. The PDT may be configured to electrically connect to a base (e.g., a docking station) via an I/O connector that includes a plurality of input/output (I/O) connector contacts. In some examples, the I/O connector may be mounted to the outer housing of the PDT through a connector opening. The I/O connector and housing may interact to substantially enclose (e.g., completely enclose or nearly completely enclose) the internal components of the PDT. For example, the I/O connector may be attached to a cap that is itself attached to the PDT outer housing, e.g., with screws.

[0015] In some examples, the outer housing of the PDT may be designed to prevent ingress of external contaminants, such as water, dirt, or dust, such that the outer housing may shield the internal components from the external contaminants The external contaminants may also affect the operability of external components of the PDT that are exposed to the contaminants, such as the I/O connector that is configured to electrically connect the PDT to a base. For example, the external contaminants may accumulate on the external connections, and may affect the ability of the external I/O connector to connect electrically to a base with minimal resistance.

[0016] The accumulation of dirt and debris on the I/O connector contacts of the PDT I/O connector may, over time, potentially inhibit electrical contact with contacts of a docking station (e.g., contacts of a base or charge rack of the docking station) when the PDT is docked for charging, data transfer, or both. Various methods may be employed to dislodge and remove the dirt and debris from the I/O connector and to clean the contacts of the I/O connector. For example, these methods may include techniques such as applying solvents externally to the I/O connector to remove dirt and clean the connector contacts of the I/O connector. Other methods may also be employed such as to vibrate the I/O connector pins to cause dirt and debris to vibrate off of the I/O connector pins.

[0017] FIG. **1** is a perspective view of an example a portable data terminal (PDT) **10**. PDT **10** may be a data collection device used to collect, interpret, process, and transfer data to a larger host data processing system. In the example shown in FIG. **1**, PDT **10** is a handheld unit (also referred to herein as a “pocket” device). In other examples, PDT **10** may have any suitable size. In addition, in the example shown in FIG. **1**, PDT **10** utilizes a form factor without a handle, but, in other examples, may include a handle (not shown). In the example shown in FIG. **1**, PDT **10** includes an outer housing **49** containing a variety of components, including a power source (not shown in FIG. **1**) and touch panel display **28**. PDT **10** may further include keypad **47** enabling input of data, where the keypad includes scan key **30**, navigation keys **32**, and power key **34**. Controls on one side of PDT **10** housing in the example shown in FIG. **1** include volume button **36**, which may be actuated by a user to control the sound amplitude of front speaker **40**, and right button **38**, which may be actuated by a user to conditionally touch panel display **28**. In addition, PDT **10** may include charge indicator LED **42**, general notification LED **44**, and microphone **48**.

[0018] PDT **10** is configured to capture data from any suitable source, such as, but not limited to, radio frequency identification (RFID) tags, images, and bar codes. In some examples, PDT **10** is also configured to capture data from a user via a user interface. In the example shown in FIG. **1**, a user interface of PDT **10** includes keypad **47** and touch panel display **28**. Keypad **47** may have any suitable configuration. For example, keypad **47** may include an alphabetic character region, a numeric character region, and special function characters. Touch panel display **28** is configured to both display and capture information. Touch panel display **28** may comprise any suitable display, such as, but not limited to, either a color or black and white liquid crystal display (LCD) with a touch sensitive overlay mounted on top of the LCD. Touch panel display **28** may be used for displaying graphics, text, and other elements to the user.

[0019] PDT **10** is configured to electrically connect to a base, e.g., of a docking station, for one or more purposes, such as, but not limited to, charging the power source (e.g., a battery) of PDT **10** or for transferring data to, from or both to and from, a host computer. In the example shown in FIG. **1**, PDT **10** includes electrical input/output (I/O) connector **46**, which is configured to electrically connect PDT **10** to a base. In some examples, I/O connector **46** may comprise an interface with a first set of electrically conductive pins or other electrical contacts configured to electrically connect PDT **10** to a second set of electrically conductive pins or other electrical contacts of the base. The electrical connection between PDT **10** and the base may be used to transmit to and receive data from a host computer, to receive power for powering PDT **10** and/or charging the power source of PDT **10**, or any combination thereof

[0020] In some examples, outer housing **49** of PDT **10** is designed to prevent ingress of external contaminants, such as water, dirt, dust, or other debris. External contaminants may adversely impact the integrity and operation of PDT **10**. For example, if water ingresses the housing of PDT **10**, the water may cause electrical shorts or corrosion of one or more components within outer housing **49**. The external contaminants may also affect the operability of external connections to I/O connector **46** on the base of PDT **10**. For example, dirt and debris may interfere with the ability of I/O connector **46** to electrically connect to a base with minimal resistance sufficient to allow the desired electrical operation of PDT **10**, such as the ability of PDT **10** to receive and transmit signals via I/O connector **46**.

[0021] In some examples, I/O connector **46** is mounted to outer housing **49** of PDT **10** through a connector opening. I/O connector **46** may attached to the outer housing **49** in a manner that a relatively tight seal exists between the I/O connector **46** and outer housing **49**, thus preventing ingress of external contaminants. For example, I/O connector **46** may be attached to outer housing **49** with the aid of a cap that is mechanically connected to PDT **10** with screws through fastening holes molded into the cap, which may also be well sealed to the external environment. Dirt and debris may accumulate on the connector contacts of I/O connector **46** which may, over time, inhibit electrical contact with a base when PDT **10** is docked in a base docking station or charging rack for battery charging and data transfer.

[0022] In some examples, PDT **10** includes an internal vibrator motor configured to cause outer housing **49** of PDT **10** or at least a portion of outer housing **49** including I/O connector **46** to vibrate, which may dislodge dirt and debris on the connector contacts of I/O connector **46**. Thus, PDT **10** may include a feature that is configured to help clean the electrical contact surfaces of I/O connector **46**. Dislodging dirt and debris on the connector contacts of I/O connector **46** may decrease the resistance of the connector contacts thereby improving the performance and reliability of I/O connector **46**.

[0023] FIG. **2** illustrates PDT **10** and an example base **50**, which may be used to recharge the internal batteries of the PDT, transfer data to PDT **10** over I/O connector **46**, or both. Base **50** may be any suitable base and may also be referred to as a “docking station” in some examples. In some examples, base **50** is used as an intermediary device to electrically connect PDT **10** to a host computer. As shown in FIG. **2**, PDT **10** is being introduced in base **50** such that I/O connector **46** aligns with electrical connector **61** of base **50** to electrically connect PDT **10** to base **50**. During normal use of PDT **10** and base **50**, dirt and debris may collect on or near electrical contacts of electrical connector **61** located in the lower portion **51** of base **50** which are configured to electrically connect with I/O connector **46** of PDT **10**.

[0024] FIG. **3** is a perspective view of base **50** and illustrates example base **50** in further detail. Base **50** includes a housing that defines terminal well **52**, which is configured to receive a part of outer housing **49** of PDT **10**. PDT **10** may be placed in terminal well **52** of base **50** so that the electrical contacts of I/O connector **46** in the PDT may make electrical contact with electrical connector contacts **61** of base **50** in the bottom of terminal well **52**. In some examples, terminal well **52** may be designed slightly larger than the base housing of PDT **10** to allow the PDT to be positioned in terminal well **52** and removed from terminal well **52** with ease, e.g., without binding. Because of the orientation of terminal well **52** in base **50**, dirt and debris may accumulate over time near the electrical contacts **61** of base **50**.

[0025] In some examples, base **50** may contain auxiliary battery well **54**, which is configured to receive internal batteries of PDT **10** and charge the batteries externally. Base **50** may also contain indicator lights. For example, in the example shown in FIG. **2**, base **50** includes COMM LED **56**, AUX battery LED **58**, and dock LED **60** used to display various operating modes of the base. Dock LED **60** may be used to indicate that PDT **10** has been placed in terminal well **52**, and that base **50** electrical contacts **61** are electrically connected with I/O connector **46** contacts of the PDT.

[0026] FIG. **4** is a block diagram illustrating an example configuration of PDT **10**. In the example shown in FIG. **4**, PDT **10** includes PDT controller **12**, vibrator motor driver **14**, vibrator motor **16**, resistance measuring circuit **18**, and I/O connector **46**. PDT controller **12**, vibrator motor driver **14**, vibrator motor **16**, resistance measuring circuit **18**, and I/O connector **46** may be enclosed in outer housing **49** of PDT **10**. Vibrator motor **16** may be used to clean dirt and debris from the electrical contacts of I/O connector **46** of PDT **10** and the electrical contacts **61** in terminal well **52** of base **50**. In one example, vibrator motor **16** of PDT **10** may be configured to vibrate the electrical contacts of I/O connector **46** of the PDT against the electrical contacts in the base of terminal well **52** of base **50**. In some examples, vibrator motor **16** may cause the electrical contacts of I/O connector **46** to vibrate against the opposing electrical contacts **61**, which may be spring loaded pins, in base **50**. The vibration of PDT **10** caused by vibrator motor **16** may push dirt and debris out of the way of I/O connector **46** contacts to insure good electrical contact between the I/O connector and electrical contacts **61** of base **50**.

[0027] In one example, PDT controller **12** activates vibrator motor **16** when PDT **10** is initially installed into base **50**. For example, controller **12** may monitor the flow of current through at least one connector contact of I/O connector **46** with resistance measuring circuit **18** via I/O connector bus **24**. For example, when PDT **10** is installed in base **50**, I/O signal **26** from I/O connector **46** may be electrically connected to electrical connector **61** of base **50** which may cause electrical current to flow to or from I/O connector **46**. Controller **12** may use resistance measuring circuit **18** to analyze the flow of electrical current to or from I/O connector **46** and, thus, detect that PDT **10** has been installed into base **50**. In another example, the user may instruct, e.g., by interacting with the keypad or touch panel display **28** (FIG. **1**) of PDT **10**, controller **12** to activate vibrator motor **16**. The user activation of vibrator motor **16** may be used in conjunction with the automatic activation of vibrator motor **16** by controller **12**, or instead of the automatic activation of vibrator motor **16**.

[0028] In one technique for operating vibrator motor **16**, described below with respect to FIG. **5**, PDT controller **12** of PDT **10** may transmit a signal via driver signal **20** to vibrator motor driver **14** to activate or deactivate vibrator motor **16** via motor signal **22**. In some examples, controller **16** may activate vibrator motor **16** for a limited, predetermined period of time (e.g., about one second to about five seconds, such as about two seconds) immediately following activation of the vibrator motor. Controller **12** may control the time for which vibrator motor **16** is activated by, for example, transmitting an activation pulse to vibrator motor driver **14** via driver signal **20**. In some examples, PDT controller **12** may monitor the status of I/O connector **46** and external I/O signal **26** via I/O connector bus **24**.

[0029] In some examples, resistance measuring circuit **18** is positioned between PDT controller **12** and I/O connector bus **24**. Controller **12** may determine the resistance of I/O connector **46** in order to detect if dirt and debris have affected the electrical operability of I/O connector **46**. In another technique, vibrator motor **16**, vibrator motor driver **14**, and resistance measuring circuit **18** may be located in base **50** and activated by a controller in base **50** when PDT **10** is installed in well **52** of base **50**.

[0030] FIG. **5** is a flow diagram showing an example method for cleaning environmental contaminants from the connector contacts of I/O connector **46** of PDT **10**. In the technique shown in FIG. **5**, controller **12** determines the resistance of one or more connector contacts of I/O connector **46** of PDT **10** (**80**), such as one connector contact or a plurality of connector contacts (e.g., all of the connector contacts of I/O connector **46** or a subset of the connector contacts). For each connector contact for which the electrical resistance is determined, controller **12** compares the determined resistance to a predetermined threshold resistance value (**82**). In response to determining the resistance of one or more I/O connector contacts **46** is greater than or equal to a predetermined threshold resistance value, controller **12** activates vibrator motor **16** to cause the connector contacts of I/O connector **46** to vibrate (**84**). In some examples, the predetermined threshold resistance value may be stored by a memory of PDT **10**, base **50**, or another device at some time prior to determination of the electrical resistance of the one or more connector contacts of I/O connector **46**.

[0031] In some examples in which controller **12** determines the resistance of a plurality of connector contacts of I/O connector **46**, controller **12** activates vibrator motor **16** to cause the connector contacts of I/O connector **46** to vibrate (**84**) in response to determining that two or more of the plurality of connector contacts exhibited resistances greater than or equal to the predetermined threshold resistance value. In other examples in which controller **12** determines the resistance of a plurality of connector contacts of I/O connector **46**, controller **12** activates vibrator motor **16** to cause the connector contacts of I/O connector **46** to vibrate (**84**) in response to determining that just one of the plurality of connector contacts exhibited a resistance greater than or equal to the predetermined threshold resistance value.

[0032] Controller **12** may, in some examples, control vibrator motor **16** to vibrate for a predetermined period of time (e.g., about one second to about five seconds, although other periods of time are contemplated). In other examples, controller may control vibrator motor **16** to vibrate for the earlier of the expiration of the predetermined period of time following activation of vibrator motor **16** or until removal of PDT **10**

from base **50** is detected (e.g., based on the power being received via I/O connector **46**). In the technique shown in FIG. **5**, after connector contacts of I/O connector **46** are vibrated (**84**), controller **12** may again determine the resistance of one or more connector contacts of I/O connector **46** (**80**) and repeat the technique shown in FIG. **5** until the resistance of the one or more connector contacts of I/O connector **46** is not greater than or equal to a predetermined threshold resistance value ("NO" branch of block **82**). In other examples, after connector contacts of I/O connector **46** are vibrated (**84**), controller **12** ends the technique shown in FIG. **5**.

[0033] Controller **12** may begin the technique shown in FIG. **5** in response to any suitable trigger event. In some examples, controller **12** determines the resistance of one or more connector contacts of I/O connector **46** (**80**) in response to determining that PDT **10** is receiving power through I/O connector **46**, which may indicate that PDT **10** has been electrically connected to base **50**. Controller **12** may determine that PDT **10** is receiving power through I/O connector **46** using any suitable technique. In one example, controller **12** may sense that a voltage external to PDT **10** has been applied to I/O connector **46**. In one case, an electrical contact (e.g., an electrically conductive pin) of I/O connector **46** may be pulled (shorted) to ground by an electrical contact (e.g., an electrically conductive pin) of electrical connector **61** of base **50**, which may be detected as a ground voltage by controller **12**. In another example, a mechanical switch may be tripped when I/O connector **46** of PDT **10** is electrically connected to base **50**, which may trigger a signal to controller **12** through a pin of I/O connector **46** in PDT **10**.

[0034] In other examples, controller **12** begins the technique shown in FIG. **5** in response to user input, which may be received via any suitable keypad or other input of PDT **10**. The user input may indicate, for example, that PDT **10** has been electrically connected to base **50** or is about to be electrically connected to base **50**.

[0035] FIG. **6** is a flow diagram illustrating another example method for cleaning environmental contaminants from the electrical contacts of I/O connector **46** in PDT **10**. In the technique shown in FIG. **6**, PDT controller **12** initializes counting variables (**62**) that are used for execution of the algorithm (technique) shown in FIG. **6**. Controller **12** may initiate the algorithm by executing an initial sampling loop for MAXCOUNT**1** number of times to determine if PDT **10** is electrically connected to base **50**. Controller **12** determines the sample counter COUNT**1** (**64**) for the number of times through the initial sampling loop and exits if the initial sampling loop has expired. In response to determining the initial sampling loop has not expired, PDT controller **12** determines if PDT **10** is drawing power from base docking station (**66**). In response to determining power is not being drawn by PDT **10** from base docking station **50**, PDT controller **12** delays N seconds and increments the loop counter COUNT**1**. In response to determining power is being drawn by PDT **10** from base docking station **50**, then the algorithm proceeds to the second sampling loop (**70**).

[0036] In some examples, by default, controller **12** may activate vibrator motor **16** for M seconds to clean off contaminants (e.g., dirt and debris) from I/O connector **46**, and then controller **12** may deactivate vibrator motor **16** (e.g., after a predetermined period of time or in response to detecting removal of PDT **10** from base **50**) (**70**). PDT controller **12** may subsequently determine if a predetermined threshold amount of current is being drawn from base docking station **50** (**72**), thus indicating that the electrical contacts of I/O connector **46** have been sufficiently cleaned of dirt and debris by vibrator motor **16**. PDT controller **12** may determine if PDT **10** is drawing predetermined threshold amount of current with resistance measuring circuit **18**. PDT controller **12** may, for example, determine that PDT **10** is drawing full current if resistance measuring circuit **18** indicates the resistance of one or more connector contacts of I/O connector **46** is below a predetermined resistance limit.

[0037] In the technique shown in FIG. **6**, in response to determining PDT **10** is not drawing full current from the base, controller **12** may activate an indicator LED, reactivate vibrator motor **16**, and increment the loop counter COUNT**2** (**74**). If controller **12** determines that the second loop counter COUNT**2** has reached the limit MAXCOUNT**2**, controller **12** determines that a sufficient number of cleaning cycles using vibrator motor **16** have been executed (**76**), and, in response, PDT controller **12** turns off vibrator motor **16** (**78**) and exits the algorithm. On the other hand, in response to determining that the second loop counter COUNT**2** has not reached the limit MAXCOUNT**2**, PDT controller **12** activates vibrator motor **16** for another M seconds (**70**). If PDT **10** is then drawing full current from base docking station **50** (**72**), PDT processor **12** exits the algorithm.

[0038] Various examples have been described. These and other examples are within the scope of the following claims.

What is claimed is:

1. A method comprising:

determining, with a controller, an electrical resistance of a connector contact of an input/output (I/O) connector of a portable data terminal (PDT);

determining, with the controller, that the electrical resistance of the connector contact of the I/O connector is greater than or equal to a predetermined threshold; and

in response to determining the electrical resistance of the connector contact of the I/O connector is greater than or equal to the predetermined threshold, activating, with the controller, a vibrator motor configured to vibrate the connector contact of the I/O connector.

2. The method of claim **1**, further comprising:

receiving power through the I/O connector of the PDT; and

determine the electrical resistance of the connector contact of the I/O connector in response to receiving the power.

3. The method of claim **1**, further comprising receiving user input, wherein determining the electrical resistance of the connector contact of the I/O connector comprises determining the electrical resistance of the connector contact of the I/O connector in response to receiving the user input.

4. The method of claim **1**, wherein when the PDT is installed into a base, the connector contact of the I/O connector of the PDT is electrically connected to an electrical contact of the base.

5. The method of claim **1**, wherein determining the electrical resistance of the connector contact of the I/O connector of the PDT comprises determining, with an electrical resistance measuring circuit of the PDT, the electrical resistance of the connector contact.

6. The method of claim **1**, further comprising, after activating the vibrator motor, deactivating the vibrator motor after a predetermined amount of time.

7. The method of claim **1**, wherein vibrating connector contact of the I/O connector of the PDT comprises vibrating environmental contaminants off the connector contact.

8. The method of claim **1**, wherein the vibrator motor is internal to the PDT.

9. The method of claim **1**, wherein the vibrator motor is external to the PDT.

10. A system comprising:

a PDT comprising an input/output (I/O) connector including a connector contact;

a resistance measuring circuit electrically connected to the connector contact of the I/O connector;

a vibrator motor; and

a controller configured to control the vibrator motor, wherein the controller is configured to determine an electrical resistance of the connector contact of the I/O connector via the resistance measuring circuit, and, in response to determining the resistance of the connector contact is greater than or equal to a resistance threshold, control the vibrator motor to vibrate.

11. The system of claim **10**, wherein the I/O connector comprises a plurality of connector contacts, the plurality of connector contacts including the connector contact, and wherein the resistance measuring circuit comprises a plurality of resistance measuring circuits, the controller being configured to determine the electrical resistance of each of the connector contacts of plurality of connector contacts via a respective resistance measuring circuit of the plurality of resistance measuring circuit and, in response to determining the resistance of at least one connector contact of the plurality of connector contacts is greater than or equal to a resistance threshold, control the vibrator motor to vibrate.

12. The system of claim **10**, wherein the controller is configured to determine the PDT is receiving power through the I/O connector, and determine the electrical resistance of the connector contact of the I/O connector in response to determining the PDT is receiving power through the I/O connector.

13. The system of claim **10**, further comprising a user interface, wherein the controller is configured to receive a user input via the user interface and determine the electrical resistance of the connector contact of the I/O connector in response to receiving the user input.

14. The system of claim **10**, wherein the PDT further comprises an electrical drive circuit electrically connected to the vibrator motor, and wherein the electrical drive circuit is configured to activate and deactivate the vibrator motor under the control of the controller.

15. The system of claim **10**, wherein the PDT comprises the vibrator motor.

16. The system of claim **10**, further comprising a base that comprises the vibrator motor, wherein the PDT is configured to be received in the base.

17. The system of claim **10**, further comprising a base configured to receive the PDT, the base comprising an electrical contact, wherein the vibrator motor is configured to, when activated, cause the connector contact of the PDT and electrical contact of the base to move against each other.

18. The system of claim **10**, wherein the controller is configured to, after activating the vibrator motor, deactivate the vibrator motor after a predetermined period of time following activation of the vibrator motor.

19. A system comprising:

a portable data unit (PDT) comprising means for receiving input and output signals;

means for vibrating the means for receiving input and output signals;

means for determining electrical resistance of the means for receiving input and output signals;

means for determining that the electrical resistance of the means for receiving input and output signals is greater than or equal to a predetermined threshold; and

means for activating the means for vibrating the means for receiving input and output signals in response to determining the electrical resistance of the means for receiving input and output signal is greater than or equal to the predetermined threshold.

20. The system of claim **19**, further comprising means for determining that the means for receiving input and output signals is receiving power, wherein the means for determining the electrical resistance of the means for receiving input and output signals determines the electrical resistance of the means for receiving input and output signals in response to the means for determining that the means for receiving input and output signals is receiving power.

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